

What Is Claimed is:

1. A method for routing direct-dialed voice-band calls over an Internet protocol (IP) network, comprising:  
2 receiving a direct-dialed voice-band call from a calling party telephone number, the direct-dialed voice-band call being associated with a destination number; and  
3 automatically routing the direct-dialed voice-band call to be routed to the destination number as a voice-over-Internet protocol (VOIP) telephone call if the calling party telephone number is registered for a VOIP service and if the destination number of the direct-dialed telephone call is accessible by the VOIP service.

1 2. The method of claim 1 further comprising:  
2 receiving a registration for the calling party's telephone number for the  
3 VOIP service prior to the calling party placing the direct-dialed telephone call.

1 3. The method of claim 2 further comprising:  
2 storing a VOIP service registration record for the calling party telephone  
3 number.

1 4. The method of claim 2 further comprising:  
2 storing an allowable destination list, which identifies the destination  
3 numbers accessible using the VOIP service, prior to the calling party placing  
4 the direct-dialed telephone call.

1           5. The method of claim 1, wherein automatically routing the direct-dialed  
2 voice-band call to the destination number as a voice-over-Internet protocol  
3 (VOIP) telephone call if the calling party telephone number is registered for a  
4 VOIP service and the destination number of the direct-dialed telephone call is  
5 accessible by the VOIP service comprises:

6           determining if a VOIP service registration record for the calling party  
7 telephone number exists; and  
8           if the VOIP service registration record for the calling party telephone  
9 number exists, determining if the destination number of the direct-dialed voice-  
10 band call is accessible by the VOIP service.

1           6. The method of claim 5 further comprising:  
2           if the calling party's telephone number is registered for the VOIP service  
3 and if the destination number of the direct-dialed voice-band call is accessible  
4 by the VOIP service, receiving an indication to route the direct-dialed voice-  
5 band call over the IP network, otherwise, receiving an indication to route the  
6 direct-dialed voice-band call over a circuit-switched public switched telephone  
7 network (PSTN).

1           7. The method of claim 6 further comprising:  
2           initiating a billing record for the direct-dialed voice-band call if the  
3 indication is to route the direct-dialed voice-band call over the IP network,  
4 wherein the billing record is associated with the calling party's telephone  
5 number.

1        8. The method of claim 7 further comprising:  
2              routing the direct-dialed voice-band call to the IP network

1        9. The method of claim 8 further comprising:  
2              receiving notice of the direct-dialed voice-band call clearing.

1        10. The method of claim 9 further comprising:  
2              closing the billing record for the direct-dialed voice-band call.

*Sub  
A2*  
1        11. An article of manufacture comprising a computer-readable medium  
2              having stored thereon instructions adapted to be executed by a processor, the  
3              instructions which, when executed, define a series of steps to route direct-  
4              dialed voice-band calls over an Internet protocol (IP) network, said steps  
5              comprising:

6              receiving a direct-dialed voice-band call from a calling party telephone  
7              number, the direct-dialed voice-band call being associated with a destination  
8              number; and

9              automatically routing the direct-dialed voice-band call to the destination  
10              number as a voice-over-Internet protocol (VOIP) telephone call if the calling  
11              party telephone number is registered for a VOIP service and if the destination  
12              number of the direct-dialed telephone call is accessible by the VOIP service.

1        12. The computer-readable medium of claim 11, wherein said steps  
2              further comprise:  
3              receiving a registration for the calling party's telephone number for the  
4              VOIP service prior to the calling party placing the direct-dialed telephone call.

1           13. The computer-readable medium of claim 12, wherein said steps  
2 further comprise:  
3           storing a VOIP service registration record for the calling party telephone  
4 number.

1           14. The computer-readable medium of claim 12, wherein said steps  
2 further comprise:  
3           storing an allowable destination list, which identifies the destination  
4 numbers accessible using the VOIP service, prior to the calling party placing  
5 the direct-dialed telephone call.

1 *Sub m* 15. A method for automatically provisioning and maintaining a network  
2 system for routing direct-dialed voice-band calls from a calling party telephone  
3 number over an Internet protocol (IP) network comprising:  
4           receiving a voice-over-Internet protocol (VOIP) service registration for  
5 the calling party telephone number;  
6           generating at least one order record for the calling party telephone  
7 number's VOIP service;  
8           storing the at least one order record for the calling party telephone  
9 number's VOIP service;  
10          managing the billing interaction for a billed account between at least one  
11 calling party telephone number and a billed telephone number;  
12          synchronizing changes made to the stored at least one order record for  
13 the calling party telephone number's VOIP service, between the network  
14 system and a billing system, due to calling party activations, disconnections and  
15 changes; and

16 processing at least one call detail record including at least a terminating  
17 access identification (ID).

1 16. The method of claim 15 further comprising:  
2 updating the at least one order record to compensate for numbering plan  
3 changes.

1 17. The method of claim 15, wherein generating each of the at least one  
2 order records for the calling party telephone number's VOIP service comprises:  
3 generating a billing system order record; and  
4 generating a network order record.

1 18. The method of claim 15, wherein storing each of the at least one  
2 order records for the calling party telephone number's VOIP service comprises:  
3 storing the billing system order record; and  
4 storing the network order record.

1 19. The method of claim 17, wherein updating each of the at least one  
2 order records to compensate for numbering plan changes comprises:  
3 updating the billing system order record; and  
4 updating the network order record.

1        20. The method of claim 15, wherein synchronizing changes due to  
2 calling party activations, disconnections and changes between the network  
3 system and a billing system comprises:  
4            ensuring for each calling party telephone number registered for the VOIP  
5 service that the billing system order record and network order record both  
6 reflect the same numbering plan changes, activations, disconnections and other  
7 changes.

1        21. The method of claim 15 further comprising:  
2            receiving a direct-dialed voice-band call to a destination number from a  
3 calling party telephone number, the direct-dialed voice-band call being  
4 associated with a destination number; and  
5            automatically routing the direct-dialed voice-band call to the destination  
6 number as a voice-over-Internet protocol (VOIP) telephone call if the calling  
7 party telephone number is registered for a VOIP service and if the destination  
8 number of the direct-dialed telephone call is accessible by the VOIP service.

1        22. The method of claim 21 further comprising:  
2            receiving a registration for the calling party's telephone number for the  
3 VOIP service prior to the calling party placing the direct-dialed telephone call.

1        23. The method of claim 22 further comprising:  
2            storing a VOIP service registration record for the calling party telephone  
3 number.

1        24. The method of claim 21 further comprising:  
2            storing an allowable destination number list, which identifies numbers  
3            accessible using the VOIP service, prior to the calling party placing the direct-  
4            dialed telephone call.

1        25. The method of claim 21, wherein automatically routing the direct-  
2            dialed voice-band call to the destination number as a voice-over-Internet  
3            protocol (VOIP) telephone call if the calling party telephone number is  
4            registered for a VOIP service and the destination number of the direct-dialed  
5            telephone call is accessible by the VOIP service comprises:  
6                determining if a VOIP service registration record for the calling party  
7                telephone number exists; and  
8                if the VOIP service registration record for the calling party telephone  
9                number exists, determining if the destination number of the direct-dialed voice-  
10              band call is accessible by the VOIP service.

1        26. The method of claim 25 further comprising:  
2                if the calling party's telephone number is registered for the VOIP service  
3                and if the destination number of the direct-dialed voice-band call is accessible  
4                by the VOIP service, receiving an indication to route the direct-dialed voice-  
5                band call over the IP network, otherwise, receiving an indication to route the  
6                direct-dialed voice-band call over a circuit-switched public switched telephone  
7                network (PSTN).

1        27. The method of claim 26 further comprising:  
2            initiating a billing record for the direct-dialed voice-band call if the  
3            indication is to route the direct-dialed voice-band call over the IP network,  
4            wherein the billing record is associated with the calling party's telephone  
5            number.

1        28. The method of claim 27 further comprising:  
2            routing the direct-dialed voice-band call to the IP network

1        29. The method of claim 28 further comprising:  
2            receiving notice of the direct-dialed voice-band call clearing.

1        30. The method of claim 29 further comprising:  
2            closing the billing record for the direct-dialed voice-band call.

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1  31. An article of manufacture comprising a computer-readable medium  
2        having stored thereon instructions adapted to be executed by a processor, the  
3        instructions which, when executed, define a series of steps to automatically  
4        provision and maintain a network system for routing direct-dialed voice-band  
5        calls from a calling party telephone number over an Internet protocol (IP)  
6        network, said steps comprising:  
7            receiving a voice-over-Internet protocol (VOIP) service registration for  
8        the calling party telephone number;  
9            generating at least one order record for the calling party telephone  
10      number's VOIP service;  
11            storing the at least one order record for the calling party telephone  
12      number's VOIP service;

13                   managing the billing interaction for a billed account between at  
14    least one calling party telephone number and a billed telephone number;  
15                   synchronizing changes made to the stored at least one order record for  
16    the calling party telephone number's VOIP service, between the network  
17    system and a billing system, due to calling party activations, disconnections and  
18    changes; and  
19                   processing at least one call detail record including at least a terminating  
20    access identification (ID).

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1                   32. The article of manufacture of claim 31 further comprising:  
2                   updating the at least one order record to compensate for numbering plan  
3    changes.

1                   33. The article of manufacture of claim 31, wherein said generating each  
2    of the at least one order records for the calling party telephone number's VOIP  
3    service step further comprises:  
4                   generating a billing system order record; and  
5                   generating a network order record.

1                   34. The article of manufacture of claim 33, wherein said storing each of  
2    the at least one order records for the calling party telephone number's VOIP  
3    service step further comprises:  
4                   storing the billing system order record; and  
5                   storing the network order record.

1        35. The article of manufacture of claim 34, wherein updating each of the  
2 at least one order records to compensate for numbering plan changes step  
3 further comprises:  
4            updating the billing system order record; and  
5            updating the network order record.

1        36. The article of manufacture of claim 34, wherein synchronizing  
2 changes due to calling party activations, disconnections and changes between  
3 the network system and a billing system step further comprises:  
4            ensuring for each calling party telephone number registered for the VOIP  
5 service that the billing system order record and network order record both  
6 reflect the same numbering plan changes, activations, disconnections and other  
7 changes.

1        37. An apparatus, comprising:  
2            a first voice-band switch; and  
3            a database coupled to the first voice-band switch;  
4            the first voice-band switch being configured to receive a direct-dialed  
5 voice-band call from a calling party's telephone number and to automatically  
6 designate the direct-dialed voice-band call as a voice-over-Internet protocol  
7 (VOIP) call.

1        38. The apparatus of claim 37, wherein the first voice-band switch is  
2 further configured to automatically route the direct-dialed voice-band call using  
3 the VOIP service when the direct-dialed voice-band call is designated as a  
4 VOIP call.

1        39. The apparatus of claim 38, wherein the first voice-band switch is an  
2 electronic switching system (ESS) originating assist switch (OAS), the database  
3 is a universal subscriber data structure (USDS) and the first voice-band switch  
4 is communicatively linked to an IP gateway.

1        40. The apparatus of claim 38, wherein the first voice-band switch is  
2 further configured to open a billing record for the VOIP call.

1        41. The apparatus of claim 37, wherein the first voice-band switch is  
2 configured to automatically designate the direct-dialed voice-band call as the  
3 VOIP call if the database contains information that the calling party's telephone  
4 number is registered for a VOIP service and if a destination number of the  
5 direct-dialed voice-band call is accessible by the VOIP service.

1        42. The apparatus of claim 37, wherein the first voice-band switch is  
2 further configured to route the VOIP call to an IP gateway for routing to an IP  
3 network, then to a destination IP gateway and then to a local access provider  
4 network for routing to a destination number of the direct-dialed voice-band call.

1        43. The apparatus of claim 37, wherein the first voice-band switch is  
2 further configured, if the database contains information that the calling party's  
3 telephone number is only registered for non-single-stage VOIP services or if the  
4 database contains information that the calling party's telephone number is  
5 registered for the single-stage VOIP service and the destination number of the  
6 direct-dialed voice-band call is inaccessible by the VOIP service, to  
7 automatically designate the direct-dialed voice-band call as a circuit-switched  
8 call; and to automatically route the direct-dialed voice-band call for routing as a

9 circuit-switched call if the direct-dialed voice-band call is designated as a circuit-  
10 switched call.

1           44. The apparatus of claim 37, further comprising:  
2           a provisioning system configured to automatically provision and maintain  
3           the network apparatus.

1           45. The apparatus of claim 44, wherein the provisioning system  
2           comprises:  
3           a network provisioning platform (NPP) configured to receive a voice-  
4           over-Internet protocol (VOIP) service registration for the calling party, to  
5           generate at least one order for the calling party's VOIP service, to store the at  
6           least one order for the calling party telephone number's VOIP service, to  
7           manage the interaction between a calling party's telephone number and a billed  
8           telephone number, and to update a plurality of service records to compensate  
9           for numbering plan changes;  
10           a billing system coupled to the NPP, wherein the billing system is  
11           configured to maintain at least one calling party's account information, to  
12           maintain the VOIP service, and to create bills based on usage, a terminating  
13           access ID and a calling plan uniform service order code (USOC); and  
14           a customer service message system (CSMS) coupled to the NPP,  
15           wherein the CSMS is configured to synchronize between the first voice-band  
16           switch and the database which is configured to store calling party telephone  
17           numbers that are registered for the VOIP service, USOC information and  
18           destination number information;

19        wherein the NPP is further configured to synchronize changes in the  
20    network system and the billing system due to calling party activations,  
21    disconnections and changes.

1        46. The apparatus of claim 45, wherein the CSMS is further configured  
2    to administer in the database at least one of the group including a country code  
3    field, a destination telephone number field, and a destination code field.

1        47. The apparatus of claim 38 further comprising:  
2        a second voice-band switch coupled to the first voice-band switch,  
3    wherein the second voice-band switch is configured to receive the automatically  
4    routed direct-dialed voice-band call from the first voice-band switch, to forward  
5    the direct-dialed voice-band call for transmission as a VOIP call, and to open a  
6    billing record for the VOIP call.

1        48. The apparatus of claim 47, wherein the first voice-band switch is  
2    further configured, if the database contains information that the calling party's  
3    telephone number is only registered for non-single-stage VOIP services or if the  
4    database contains information that the calling party's telephone number is  
5    registered for the single-stage VOIP service and the destination number of the  
6    direct-dialed voice-band call is inaccessible by the VOIP service, to  
7    automatically designate the direct-dialed voice-band call as a circuit-switched  
8    call; and to automatically route the direct-dialed voice-band call for routing as a  
9    circuit-switched call if the direct-dialed voice-band call is designated as a circuit-  
10   switched call.

1        49. The apparatus of claim 47, wherein the second voice-band switch is  
2 further configured to route the direct-dialed call to an IP gateway for routing to  
3 an IP network, then to a destination IP gateway and then to a local access  
4 provider network for routing to a destination number of the direct-dialed voice-  
5 band call.

1        50. The apparatus of claim 47, wherein the first voice-band switch is an  
2 electronic switching system (ESS) originating assist switch (OAS), the second  
3 voice-band switch is an ESS handoff assist switch (HAS), the database is a  
4 universal subscriber data structure (USDS) and the second voice-band switch is  
5 communicatively linked to an IP gateway.

1        51. The apparatus of claim 48, wherein the first voice-band switch is  
2 further configured to automatically route the direct-dialed voice-band call as a  
3 circuit-switched call if the direct-dialed voice-band call is to be routed as a  
4 circuit-switched call.

1        52. The apparatus of claim 48, further comprising:  
2            a provisioning system configured to automatically provision and maintain  
3            the network apparatus.

1        53. The apparatus of claim 52, wherein the provisioning system  
2 comprises:  
3            a network provisioning platform (NPP) configured to receive a voice-  
4 over-Internet protocol (VOIP) service registration for the calling party, to  
5 generate at least one order for the calling party's VOIP service, to store the at  
6 least one order for the calling party's VOIP service, to manage the interaction

7 between a billed telephone number and a calling party's telephone number, and  
8 to update a plurality of calling party records to compensate for numbering plan  
9 changes;

10 a billing system coupled to the NPP, wherein the billing system is  
11 configured to maintain at least one calling party's account information, to  
12 maintain the VOIP service, and to create bills based on usage, a terminating  
13 access ID and a calling plan uniform service order code (USOC); and  
14 a customer service message system (CSMS) coupled to the NPP,  
15 wherein the CSMS is configured to synchronize between the first voice-band  
16 switch and the database which is configured to store calling party telephone  
17 numbers that are registered for the VOIP service, USOC information and  
18 destination number information;

19 wherein the NPP is further configured to synchronize changes in the  
20 network system and the billing system due to calling party activations,  
21 disconnections and changes.

1 54. The apparatus of claim 53, wherein the CSMS is further configured  
2 to administer in the database at least one of the group including a country code  
3 field, a destination telephone number field, and a destination code field.

1 55. An apparatus, comprising:  
2 an electronic switching system (ESS) originating assist switch (OAS), the  
3 OAS being configured to receive a direct-dialed voice-band call from a calling  
4 party's telephone number, the direct-dialed voice-band call being associated  
5 with a destination telephone number, to determine whether to route the direct-  
6 dialed voice-band call over an Internet protocol (IP) network or a circuit-  
7 switched network, and, if it is determined to route the direct-dialed voice-band

8 call over the IP network, the OAS is configured to transmit the direct-dialed  
9 voice-band call to the IP network, or, if it is determined to continue to route the  
10 direct-dialed voice-band call over the circuit-switched network, the OAS is  
11 configured to transmit the direct-dialed voice-band call to the circuit-switched  
12 network; and

13 an universal subscriber data structure (USDS) coupled to the ESS OAS,  
14 the USDS being configured to store service information on a plurality of calling  
15 party telephone numbers, to store information on which destination telephone  
16 numbers are accessible using a voice-over-Internet protocol (VOIP) service, to  
17 receive the calling party's telephone number and the destination telephone  
18 number of the direct-dialed voice-band call from the OAS, to determine if the  
19 calling party's telephone number is registered for the VOIP service, and, if the  
20 calling party's telephone number is registered for the VOIP service, to  
21 determine if the destination telephone number is accessible using the VOIP  
22 service, and to return a partial routing instruction and service information to the  
23 OAS.

1 56. The apparatus of claim 55 further comprising:  
2 an ESS handoff assist switch (HAS) coupled to the OAS, wherein the  
3 HAS is configured to receive the direct-dialed voice-band call and to route the  
4 direct-dialed voice-band call to the VOIP network if the calling party's telephone  
5 number is registered for the VOIP service.

1 57. The apparatus of claim 55 further comprising:  
2 a provisioning system configured to automatically provision and maintain  
3 the network apparatus.

1        58. The apparatus of claim 55 further comprising:  
2            a network provisioning platform (NPP) configured to receive a voice-  
3        over-Internet protocol (VOIP) service registration for the calling party, to  
4        generate at least one order for the calling party's VOIP service, to store the at  
5        least one order for the calling party's VOIP service, to manage the billing  
6        interaction for a billed account between at least one calling party telephone  
7        number and a billed telephone number, to update a plurality of calling party  
8        records to compensate for numbering plan changes, and to synchronize  
9        changes made to the stored at least one order record for the calling party  
10        telephone number's VOIP service, between the network system and a billing  
11        system, due to calling party activations, disconnections and changes;  
12            a billing system coupled to the NPP, wherein the billing system is  
13        configured to maintain at least one calling party's account information, to  
14        maintain the VOIP service, and to create bills based on usage, a terminating  
15        access ID and a calling plan uniform service order code (USOC); and  
16            a customer service message system (CSMS) coupled to the NPP,  
17        wherein the CSMS is configured to synchronize between the first voice-band  
18        switch and a database configured to store calling party telephone numbers,  
19        USOC information and destination number information.

1        59. The apparatus of claim 55, wherein the CSMS is further configured  
2        to administer a country code field which is stored in the database.

1           60. A system for automatically provisioning and maintaining a network  
2   system for routing direct-dialed voice-band calls from a calling party telephone  
3   number over an Internet protocol (IP) network comprising:  
4           a network provisioning component configured to receive a voice-over-  
5   Internet protocol (VOIP) service registration for the calling party telephone  
6   number, to generate at least one order record for the calling party telephone  
7   number's VOIP service, to store the at least one order record for the calling  
8   party telephone number's VOIP service, to manage the billing interaction for a  
9   billed account between at least one calling party telephone number and a billed  
10   telephone number, and to update the at least one order record to compensate  
11   for numbering plan changes;  
12           a billing system component coupled to the network provisioning  
13   component, wherein the billing system component is configured to maintain at  
14   least one calling party's account information, to maintain the VOIP service, to  
15   create bills based on usage, terminating access ID and calling plan uniform  
16   service order code (USOC); and  
17           a customer service message system (CSMS) component coupled to the  
18   network provisioning component, wherein the CSMS component is configured  
19   to synchronize changes made to the stored at least one order record for the  
20   calling party telephone number's VOIP service, between at least one  
21   telecommunications switch and a database, which stores calling party  
22   telephone numbers that are registered for the VOIP service, USOC information  
23   and destination number information;  
24           wherein the network provisioning component is further configured to  
25   synchronize changes made to the stored at least one order record for the  
26   calling party telephone number's VOIP service, between the network system

27 and a billing system, due to calling party activations, disconnections and  
28 changes.

1        61. The system of claim 60, wherein the CSMS component is further  
2 configured to administer a country code field which is stored in the database.

1        62. The system of claim 60 further comprising:  
2            a first voice-band switch; and  
3            a database coupled to the first voice-band switch;  
4            the first voice-band switch being configured to receive a direct-dialed  
5            voice-band call from a calling party's telephone number and to automatically  
6            designate the direct-dialed voice-band call as a voice-over-Internet protocol  
7            (VOIP) call.

1        63. The system of claim 62, wherein the first voice-band switch is further  
2 configured to automatically route the direct-dialed voice-band call using the  
3 VOIP service when the direct-dialed voice-band call is designated as a VOIP  
4 call.

1        64. The system of claim 63, wherein the first voice-band switch is an  
2 electronic switching system (ESS) originating assist switch (OAS), the database  
3 is a universal subscriber data structure (USDS) and the first voice-band switch  
4 is communicatively linked to an IP gateway.

1        65. The system of claim 62, wherein the first voice-band switch is further  
2 configured to open a billing record for the VOIP call.

1        66. The system of claim 64, wherein the first voice-band switch is further  
2 configured to automatically route the direct-dialed voice-band call as a circuit  
3 switched call if the direct-dialed voice-band call is to be routed as a circuit  
4 switched call.

1        67. The system of claim 64 further comprising:  
2            a second voice-band switch coupled to the first voice-band switch,  
3 wherein, if the direct-dialed voice-band call is being routed as a VOIP call, the  
4 second voice-band switch is configured to receive the direct-dialed voice-band  
5 call from the first voice-band switch, open a billing record for the VOIP call, and  
6 to forward the direct-dialed voice-band call for transmission as a VOIP call.

1        68. The system of claim 64, further comprising:  
2            a provisioning system configured to automatically provision and maintain  
3 the network apparatus.

1        69. The system of claim 65, wherein the first voice-band switch is an  
2 electronic switching system (ESS) originating assist switch (OAS), the second  
3 voice-band switch is an ESS handoff assist switch (HAS) and the database is a  
4 universal subscriber data structure (USDS).

1        70. The system of claim 65, wherein the first voice-band switch is further  
2 configured to automatically route the direct-dialed voice-band call as a circuit  
3 switched call if the direct-dialed voice-band call is to be routed as a circuit  
4 switched call.